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WATER TEMPERATURES OF THE WILLAMETTE RIVER BASIN 1950

SPECIAL SCIENTIFIC REPORT: FISHERIES No. 69

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Explanatory Note

The series embodies results of investigations, usually of restricted scope, intended to aid or direct management or utilization practices and as guides for administrative or legislative action. It is issued in limited quantities for the official use of Federal, State of cooperating agencies and in processed form for economy and to avoid delay in publication.

Washington, D. C.
February, 1952

United States Department of the Interior, Oscar L. Chapman, Secretary
Fish and Wildlife Service, Albert M. Day, Director

WATER TEMPERATURES OF THE WILLAMETTE RIVER SYSTEM, 1950

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Special Scientific Report: Fisheries No. 69

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CONTENTS

	Page
Thermograph stations	2
Thermograph operation	2
Acknowledgments	3
References	3

FIGURES

No.		
1.	Willamette River system, showing location of thermographs	4
2.	Willamette River maximum water temperatures	5
3.	North Santiam River maximum water temperatures	6
4.	Willamette River Middle Fork maximum water temperatures	7
5.	Willamette River Coast Fork maximum water temperatures	8
6.	Row River maximum water temperatures	9

TABLES

No.		
1.	Santiam River at Jefferson	10
2.	North Santiam River at Big Cliff damsite	11
3.	North Santiam River at Idanha	12
4.	Breitenbush River at Camp Mongold	13
5.	Willamette River at Corvallis	14
6.	Willamette River, Middle Fork, at Lowell Junction	15
7.	Willamette River, Middle Fork, at Westfir Junction	16
8.	Willamette River, Coast Fork, at Cottage Grove Dam	17
9.	Willamette River, Coast Fork, near London	18
10.	Row River at Dorena Reservoir Outlet	19
11.	Row River at Dorena Reservoir Inlet	20
12.	Long Tom River at Monroe	21
13.	Willamette River at Eugene	22
14.	Willamette River at Corvallis, 1948	23
15.	Willamette River at Corvallis, 1949	24
16.	McKenzie River near Walterville	25

WATER TEMPERATURES OF THE WILLAMETTE RIVER SYSTEM, 1950

Owing to an extensive program for development of multipurpose water-use projects on the Columbia River system, tributaries of the lower Columbia River have become extremely important for maintaining the salmon fisheries of the river.

The Willamette River, a major tributary of the Columbia River, drains about 11,000 square miles of northwest Oregon lying between the Cascade and Coast Ranges. It empties into the Columbia near Portland, Oregon. Tributaries of the Willamette River support significant runs of spring chinook salmon and steelhead.

Development of water-use and flood-control projects on the Willamette River System is changing the ecology of many of the Willamette streams. Changes in temperature and chemical composition of the water will affect fish populations in the System and must be carefully considered in planning a fishery-management program. According to Fish and Rucker (1950) water temperatures play an important role in the formation and lifting of the Willamette River oxygen block. Where temperatures are already near the upper limit of tolerance for salmonoid fishes, and any increase might present a block to migrating fishes, it is especially important to have thermal data before and after projects are developed. These records will be useful in locating hatcheries, in selecting races or species of fish for introduction to reservoirs and modified streams, and in predicting water temperatures that will obtain after reservoirs are built.

The temperature of water discharged from some impoundments can be regulated within limits by manipulation of discharge valves or gates; that is, by spacing several gates at various elevations in a dam, water may be drawn from different depths of the impoundment. In general, the deeper the discharge gate is, the cooler the water will be. Thus it might be possible to favorably alter the temperature of the stream below an impoundment. However, after leaving a reservoir and in continuing to flow downstream, the water is exposed to almost the same thermal influences as an unimpounded stream would encounter (Craig 1946). In order to study the effect of air temperature and other thermal influences on flowing water, it is planned to install thermographs at intervals along the river below Dorena Dam (near Cottage Grove, Oregon). This dam has a series of discharge gates at different elevations, permitting the draw-down of cool subsurface water from the reservoir. The thermographs will make it possible to determine the extent of this cooling influence downstream.

The primary purpose of this investigation is to study the changes in water temperature resulting from development of projects on the Willamette River System. The investigation will continue for several year, and more

nearly complete analysis of water temperatures will follow. However, in order to make temperature records already recorded available to agencies interested in management of Willamette River fisheries, the temperature data are presented in this report in tabular and graphic form.

THERMOGRAPH STATIONS

The U. S. Army Corps of Engineers and Fish and Wildlife Service cooperated in planning for the survey of Willamette River System water temperatures and in selection of thermograph stations. The limited number of thermographs available for the investigation influenced the location of stations.

Stations were selected to include two established reservoirs (Cottage Grove and Dorena) and two reservoirs under construction and not yet impounding water (Detroit and Meridian). At all four, thermographs were operated in the streams upstream and downstream from the reservoirs. Upstream recorders were located just above the maximum impoundment influences of the reservoirs and downstream instruments within one-half mile of reservoir discharge gates. Additional stations were located on the McKenzie River near Walterville, North Santiam River at Jefferson, Long Tom River at Monroe, Breitenbush River at Camp Mongold, and on the main stem of the Willamette River at Corvallis and Eugene.

THERMOGRAPH OPERATION

All water temperatures except those for Eugene were recorded by constant-recording thermographs specified by the manufacturers to be capable of recording temperatures accurately within one-half of 1 degree Fahrenheit with a range from 32° to 85°. Some thermographs which had been in operation for four seasons failed to maintain this accuracy. It was necessary to make several calibrations during the season and to correct for errors. Eugene temperatures were tabulated from hourly cooling-water temperatures recorded by operating staff at the Eugene Water and Electric Board's Steam Plant at Eugene.

One thermograph had been in operation at Corvallis during 1948 and 1949. The temperature records for Corvallis include these two years in separate tables.

To obtain representative water temperatures, the bulbs of the instruments were placed in the streams where the water was well mixed. To assure precision the instruments were carefully calibrated in the field at intervals of about six weeks. Four field calibrations were made on each instrument during the season.

ACKNOWLEDGMENTS

Cooperating staff members of the Fish and Wildlife Service and the Portland District Corps of Engineers aided in developing and carrying on this temperature-survey program. Fish and Wildlife Service staff members who helped collect records include Joseph R. Gauley, Lewis C. Schlotterbeck, and Donovan R. Craddock. Parker S. Trefethen helped check records and draw figures.

The U. S. Forest Service, Geological Survey, Corps of Engineers, the Eugene Water and Electric Board, Oregon State Highway Commission, and Lane County Court all granted permission to install thermographs on property under their jurisdiction.

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1946. An investigation of fish-maintenance problems in relation to the Willamette Valley Project. U. S. Fish and Wildlife Service, Special Scientific Report No. 33.

Fish, Frederic F., and Robert R. Rucker
1950. Pollution in the Lower Columbia Basin in 1948 with particular reference to the Willamette River. U. S. Fish and Wildlife Service, Special Scientific Report: Fisheries No. 30.

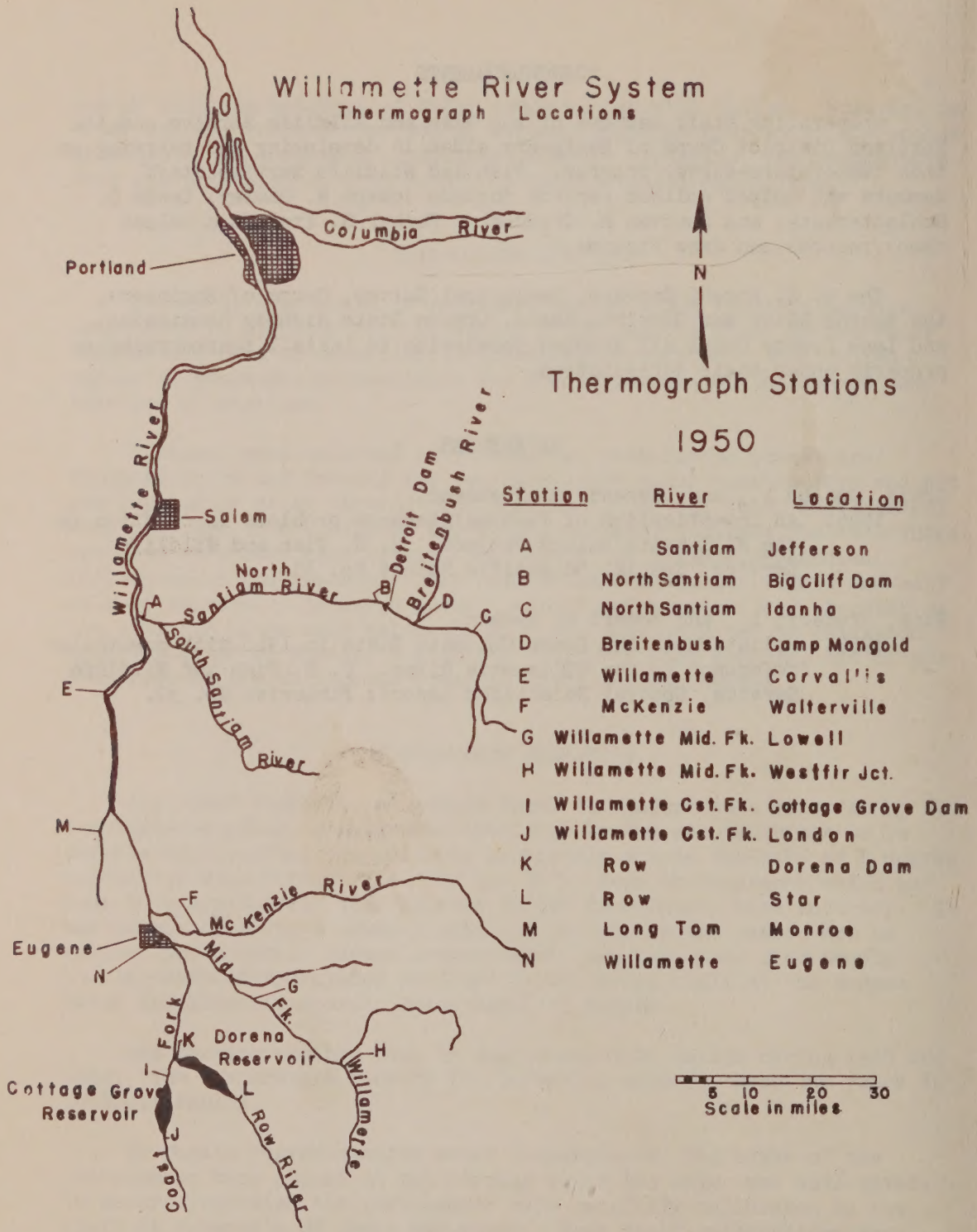


Figure 1. Willamette River system, showing location of thermographs

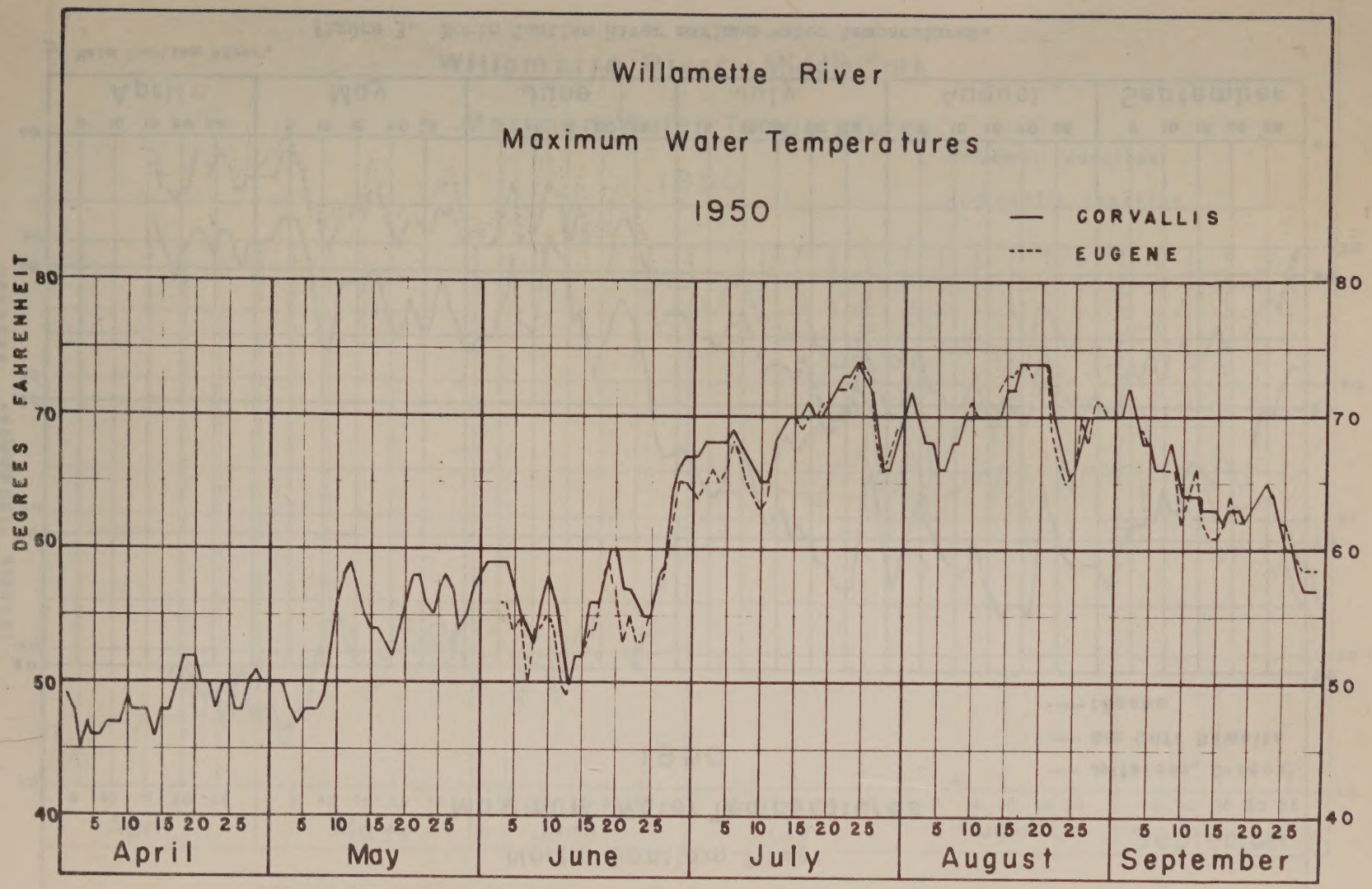
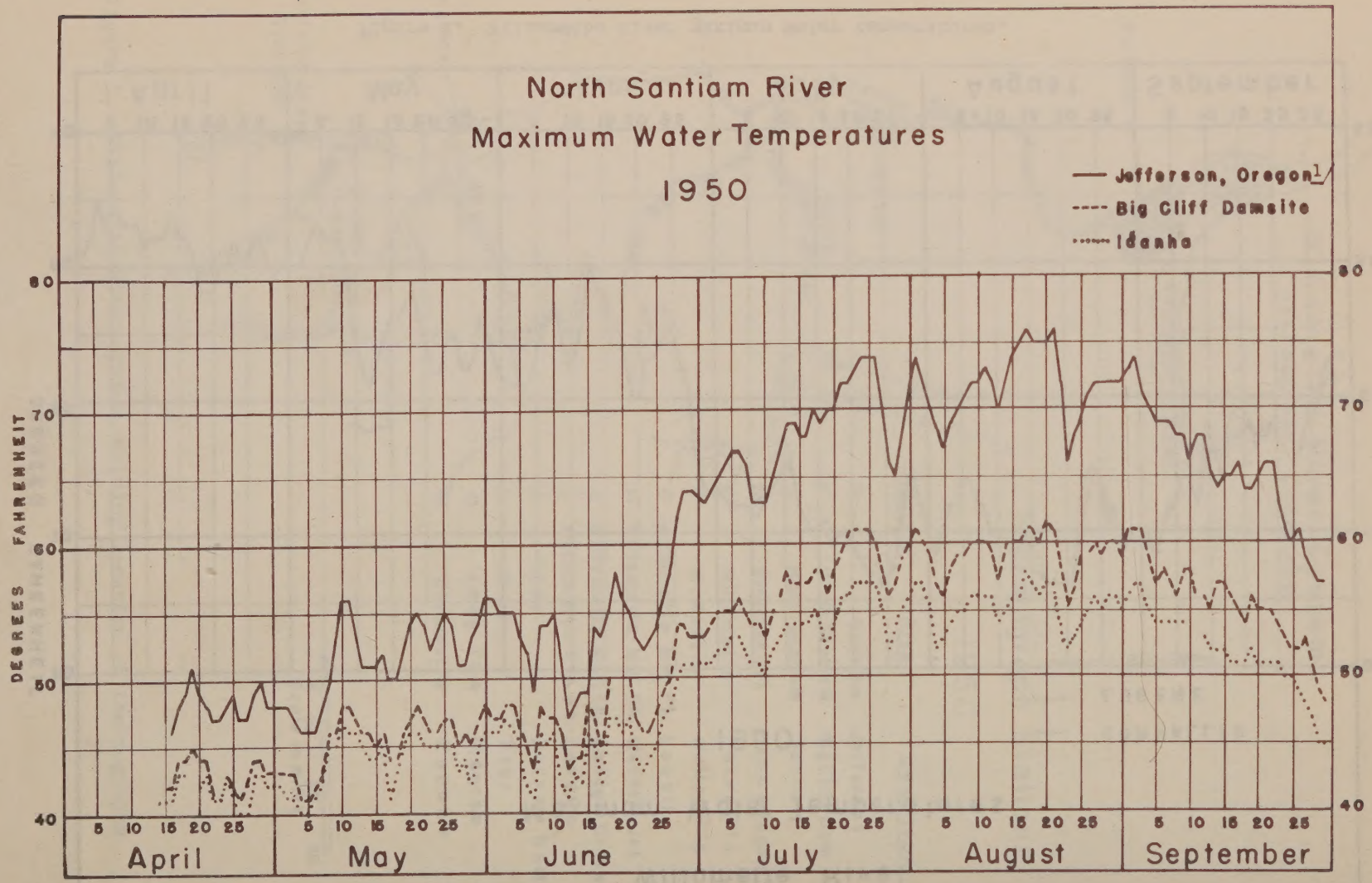


Figure 2. Willamette River maximum water temperatures.



1/ Main Santiam River.

Figure 3. North Santiam River maximum water temperatures.

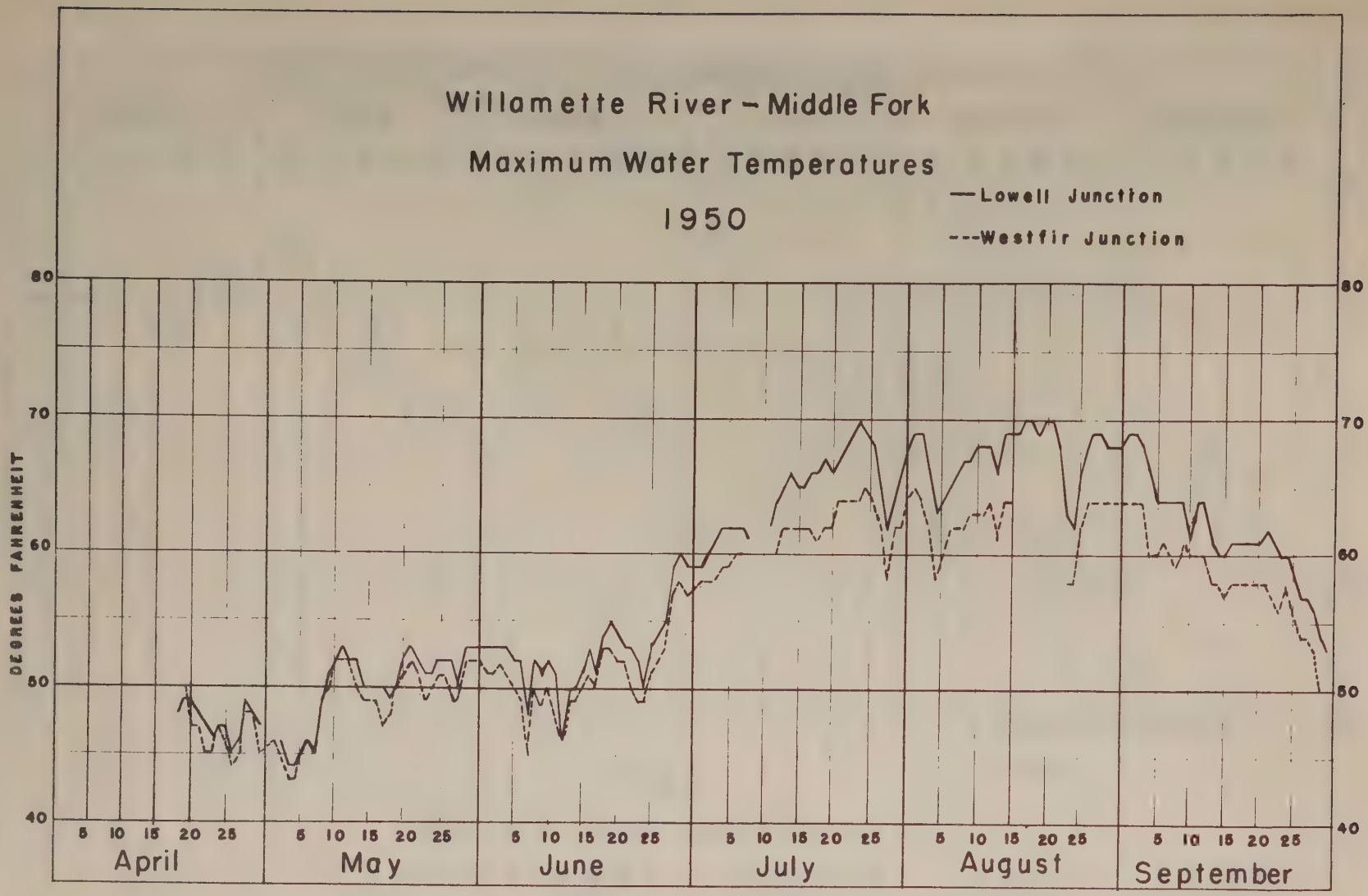


Figure 4. Willamette River Middle Fork maximum water temperatures.

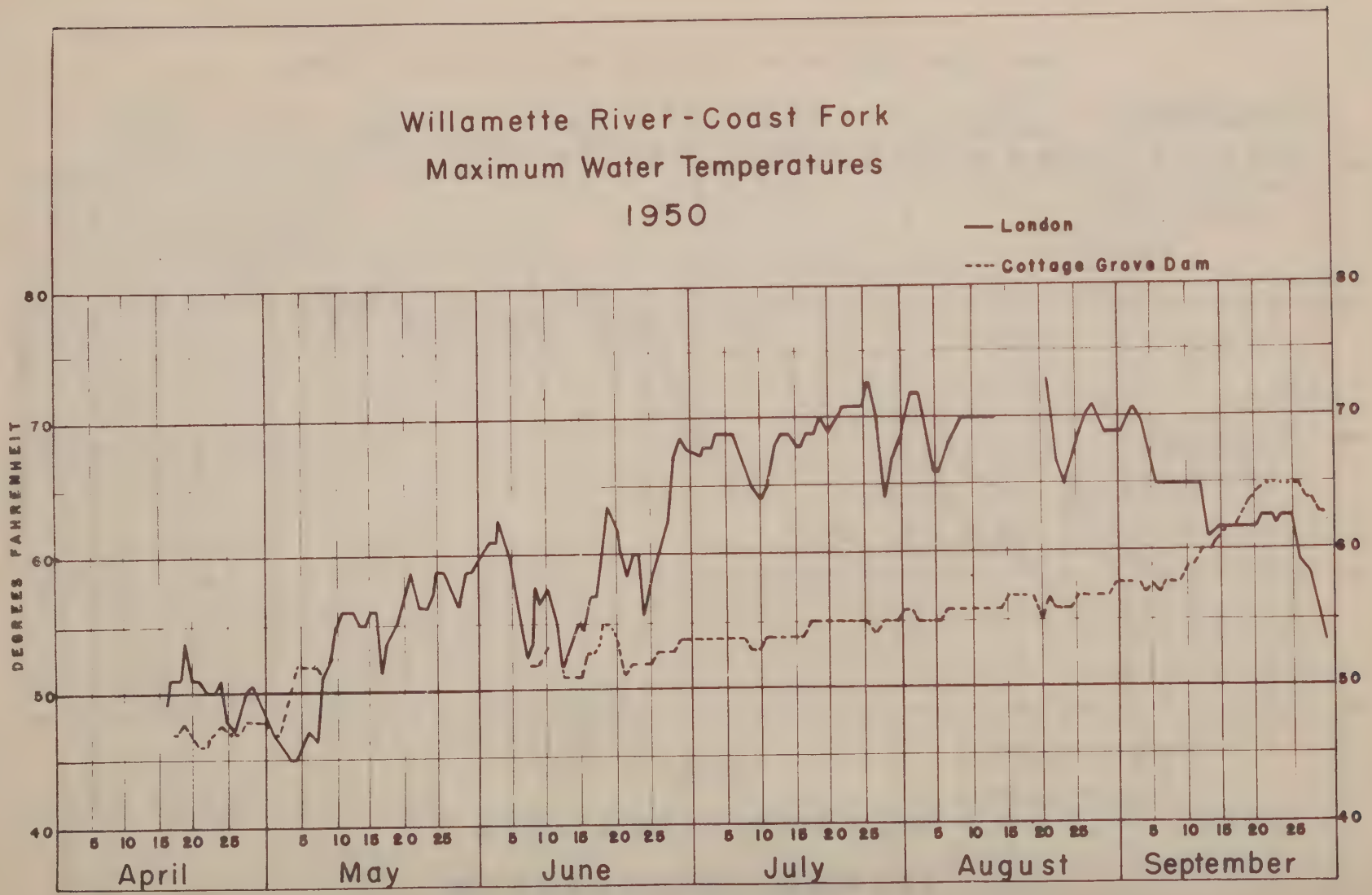


Figure 5. Willamette River Coast Fork maximum water temperatures.

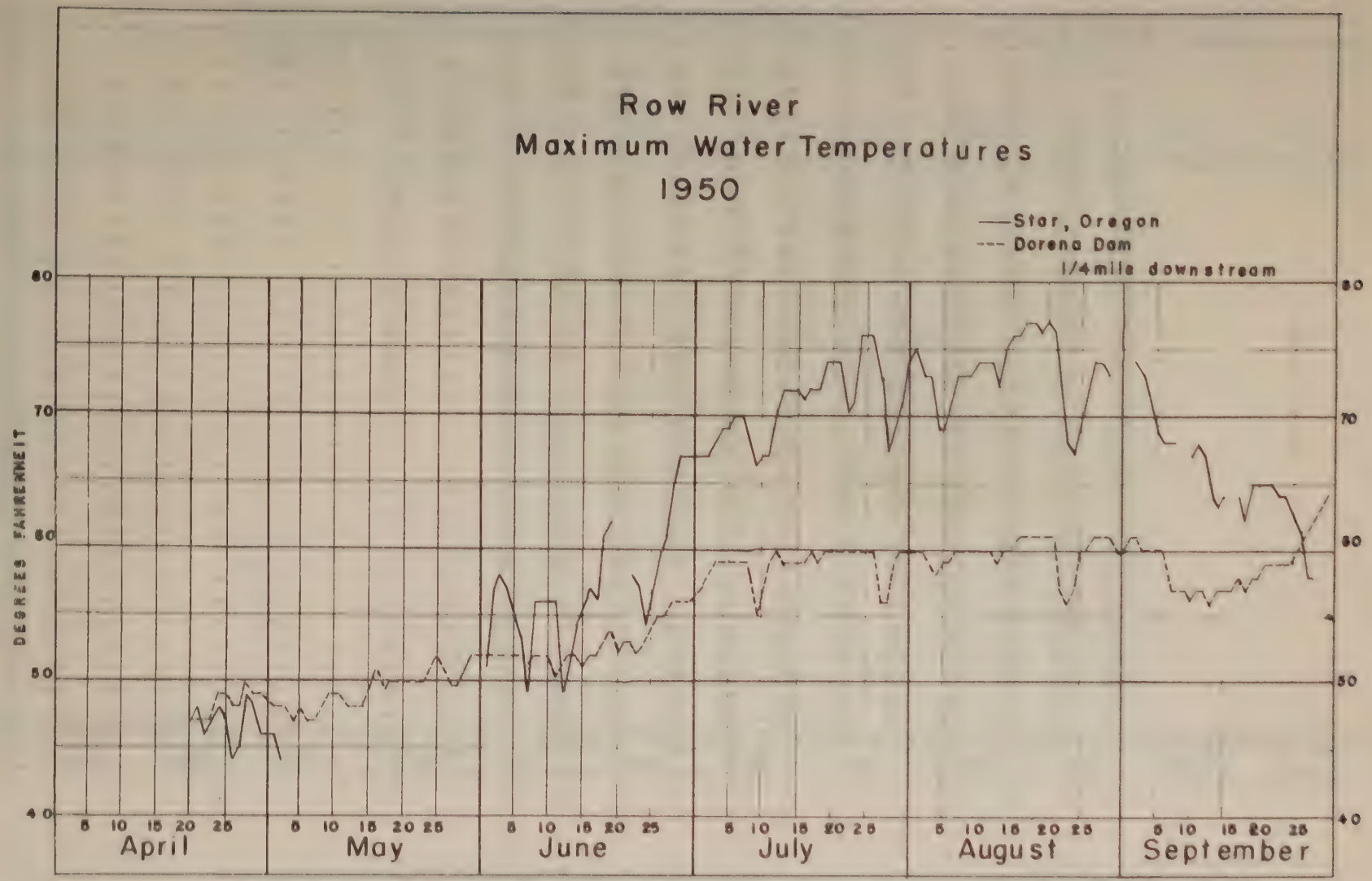


Figure 6. Row River maximum water temperatures.

Table 1. —Water temperatures in degrees Fahrenheit, Santiam River at Jefferson, Oreg., 1950
Thermograph on highway bridge, U.S. Highway 99E., Sec. 11, T. 10S., R. 3W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	–	–	–	–	–	–	–	–	48	45	56	50	63	56	74	65	73	64	56	51				
2	–	–	–	–	–	–	–	–	48	45	55	50	64	56	72	66	74	65	54	51				
3	–	–	–	–	–	–	–	–	47	44	55	50	65	57	70	68	71	65	52	51				
4	–	–	–	–	–	–	–	–	46	44	55	50	66	58	68	62	70	63	54	51				
5	–	–	–	–	–	–	–	–	46	44	53	50	67	58	67	61	69	62	55	52				
6	–	–	–	–	–	–	–	–	46	43	52	48	67	60	69	60	69	62	53	51				
7	–	–	–	–	–	–	–	–	48	44	49	47	66	59	70	63	69	61	54	50				
8	–	–	–	–	–	–	–	–	50	44	54	46	63	58	71	62	68	62	54	52				
9	–	–	–	–	–	–	–	–	53	46	54	50	63	59	72	63	68	60	52	50				
10	–	–	–	–	–	–	–	–	56	48	55	50	63	57	72	64	66	60	53	51				
11	–	–	–	–	–	–	–	–	56	50	52	47	65	57	73	65	68	60	54	52				
12	–	–	–	–	–	–	–	–	53	50	47	46	67	59	72	64	68	61	55	53				
13	–	–	–	–	–	–	–	–	51	48	48	45	69	62	70	64	65	61	56	54				
14	–	–	–	–	–	–	–	–	51	47	49	46	69	62	72	65	64	59	55	53				
15	–	–	–	–	–	–	–	–	51	46	49	47	68	62	74	66	65	58	53	51				
16	–	–	–	–	–	–	46	44	52	47	54	48	68	61	75	67	65	59	51	50				
17	–	–	–	–	–	–	48	44	50	48	53	49	70	62	76	67	66	59	51	50				
18	–	–	–	–	–	–	49	44	50	44	55	48	69	64	75	66	64	59	52	50				
19	–	–	–	–	–	–	51	45	52	46	58	52	70	64	75	67	64	59	52	51				
20	–	–	–	–	–	–	49	47	54	47	56	53	70	63	75	67	65	58	51	50				
21	–	–	–	–	–	–	48	45	55	49	55	50	72	64	76	67	66	58	50	49				
22	–	–	–	–	–	–	47	45	54	50	53	51	72	64	72	66	66	60	50	49				
23	–	–	–	–	–	–	47	43	52	48	52	49	73	65	66	63	63	59	53	50				
24	–	–	–	–	–	–	48	43	54	47	53	49	74	66	68	62	61	59	52	51				
25	–	–	–	–	–	–	49	45	55	48	54	49	74	67	69	63	60	58	52	50				
26	–	–	–	–	–	–	47	44	54	49	56	50	74	66	71	64	61	57	50	48				
27	–	–	–	–	–	–	47	43	51	48	58	52	70	64	72	65	59	54	48	48				
28	–	–	–	–	–	–	49	44	51	46	62	54	66	61	72	64	58	54	–	–				
29	–	–	–	–	–	–	50	45	53	48	64	56	65	61	72	64	57	53	–	–				
30	–	–	–	–	–	–	48	45	54	48	64	57	69	60	72	64	57	52	–	–				
31	–	–	–	–	–	–	–	–	56	49	–	–	72	63	72	63	–	–	–	–				
Av.							48.2	44.4	51.5	46.8	54.3	49.6	68.1	61.1	71.7	64.4	65.3	59.4	52.7	50.7				

Table 2. --Water temperatures in degrees Fahrenheit, N. Santiam River at Big Cliff Damsite, Oreg., 1950
Thermograph on old logging bridge 1/4 mile below Big Cliff Damsite, Sec. 27, T. 9S., R. 4E., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	-	-	-	-	-	-	-	-	43	40	47	42	53	48	61	54	61	54	48	41				
2	-	-	-	-	-	-	-	-	43	39	47	42	54	48	60	55	61	55	45	41				
3	-	-	-	-	-	-	-	-	43	40	48	41	55	48	59	54	61	56	47	45				
4	-	-	-	-	-	-	-	-	41	39	48	42	55	49	57	52	59	55	50	47				
5	-	-	-	-	-	-	-	-	41	38	46	42	55	49	56	51	57	52	49	47				
6	-	-	-	-	-	-	-	-	42	37	45	42	56	50	58	51	58	52	47	46				
7	-	-	-	-	-	-	-	-	43	39	43	42	55	50	59	52	57	52	52	47				
8	-	-	-	-	-	-	-	-	46	40	48	42	54	49	59	53	56	52	50	48				
9	-	-	-	-	-	-	-	-	46	40	47	43	54	51	60	54	58	52	50	45				
10	-	-	-	-	-	-	-	-	48	41	47	44	53	49	60	53	58	51	49	47				
11	-	-	-	-	-	-	-	-	48	40	46	43	55	48	60	54	56	51	52	48				
12	-	-	-	-	-	-	-	-	47	41	43	42	56	49	59	54	56	51	52	49				
13	-	-	-	-	-	-	-	-	46	41	44	41	58	51	57	53	55	51	51	49				
14	-	-	-	-	-	-	-	-	46	39	44	43	57	52	60	54	57	52	50	48				
15	-	-	-	-	-	-	42	39	45	39	48	43	57	51	60	54	57	51	48	45				
16	-	-	-	-	-	-	42	40	46	39	47	44	57	51	60	54	56	51	46	45				
17	-	-	-	-	-	-	44	39	44	40	45	43	58	51	61	55	55	50	47	46				
18	-	-	-	-	-	-	44	38	44	38	50	43	58	52	61	55	54	49	49	47				
19	-	-	-	-	-	-	45	39	46	39	-	-	56	53	60	54	56	51	48	47				
20	-	-	-	-	-	-	44	39	47	40	-	-	58	51	62	55	55	50	48	47				
21	-	-	-	-	-	-	44	39	48	41	50	44	59	52	61	56	55	50	49	46				
22	-	-	-	-	-	-	41	39	47	42	47	45	61	54	59	55	55	50	48	47				
23	-	-	-	-	-	-	42	38	46	39	46	44	61	54	55	53	54	50	50	47				
24	-	-	-	-	-	-	43	36	46	39	46	43	61	55	57	53	53	50	49	47				
25	-	-	-	-	-	-	42	38	47	40	47	44	61	55	59	52	52	51	-	-				
26	-	-	-	-	-	-	41	37	47	41	49	45	60	54	59	53	52	49	-	-				
27	-	-	-	-	-	-	42	39	45	42	50	46	58	54	60	54	53	47	-	-				
28	-	-	-	-	-	-	44	38	46	39	54	47	56	52	59	53	51	45	-	-				
29	-	-	-	-	-	-	44	38	45	42	54	48	57	51	60	53	49	44	-	-				
30	-	-	-	-	-	-	43	39	47	40	53	48	59	51	60	54	48	42	-	-				
31	-	-	-	-	-	-	-	-	48	41	-	-	60	53	59	54	-	-	-	-				
Av.							42.9	38.4	45.4	39.8	47.5	43.5	57.0	51.1	59.3	53.6	55.5	50.5	48.9	46.3				

Table 3. -- Water temperatures in degrees Fahrenheit, N. Santiam River at Idanha, Oreg., 1950
Thermograph on Forest Service bridge, Sec. 16, T. 10S., R. 6E., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov,		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	-	-	-	-	-	-	-	-	42	39	46	45	51	45	57	50	56	51	45	41				
2	-	-	-	-	-	-	-	-	41	38	46	40	51	45	57	50	57	51	45	42				
3	-	-	-	-	-	-	-	-	41	38	47	40	52	45	55	49	57	52	46	45				
4	-	-	-	-	-	-	-	-	40	39	46	40	52	46	52	47	55	51	47	46				
5	-	-	-	-	-	-	-	-	40	39	45	41	53	46	53	48	54	48	47	45				
6	-	-	-	-	-	-	-	-	41	38	42	40	53	46	54	47	54	49	46	44				
7	-	-	-	-	-	-	-	-	42	39	41	40	52	47	55	48	54	48	48	45				
8	-	-	-	-	-	-	-	-	45	39	46	40	51	46	55	49	54	49	47	46				
9	-	-	-	-	-	-	-	-	45	38	45	41	51	48	56	49	54	49	46	44				
10	-	-	-	-	-	-	-	-	47	39	46	41	50	46	56	49	-	-	47	46				
11	-	-	-	-	-	-	-	-	46	39	42	41	52	45	56	49	-	-	47	45				
12	-	-	-	-	-	-	-	-	46	39	41	40	53	46	56	49	53	-	48	46				
13	-	-	-	-	-	-	-	-	45	40	43	40	54	47	54	49	52	48	48	46				
14	-	-	-	-	-	-	41	38	44	38	42	41	54	48	55	50	52	48	-	-				
15	-	-	-	-	-	-	41	39	44	38	46	41	54	47	56	50	52	47	-	-				
16	-	-	-	-	-	-	41	39	45	38	45	41	54	47	56	49	51	47	-	-				
17	-	-	-	-	-	-	43	39	41	40	42	41	55	48	58	51	51	47	-	-				
18	-	-	-	-	-	-	43	38	43	38	47	41	54	48	57	51	51	46	-	-				
19	-	-	-	-	-	-	-	-	45	39	47	42	52	49	56	50	52	49	-	-				
20	-	-	-	-	-	-	42	38	46	39	46	42	54	47	57	51	51	47	-	-				
21	-	-	-	-	-	-	43	39	46	39	47	42	56	48	57	51	51	47	-	-				
22	-	-	-	-	-	-	41	39	45	40	44	42	56	49	54	50	51	47	-	-				
23	-	-	-	-	-	-	41	37	45	38	43	42	57	50	52	50	51	47	-	-				
24	-	-	-	-	-	-	43	37	45	39	44	42	57	50	53	50	50	48	-	-				
25	-	-	-	-	-	-	41	38	45	39	45	41	57	50	54	49	50	49	-	-				
26	-	-	-	-	-	-	40	37	45	39	47	42	57	49	55	49	49	47	-	-				
27	-	-	-	-	-	-	40	38	43	40	48	43	55	50	56	50	48	46	-	-				
28	-	-	-	-	-	-	43	38	44	39	50	44	52	49	55	49	47	44	-	-				
29	-	-	-	-	-	-	43	38	42	40	51	44	54	48	56	50	45	43	-	-				
30	-	-	-	-	-	-	42	38	45	39	51	44	55	47	56	50	45	42	-	-				
31	-	-	-	-	-	-	-	-	46	39	-	-	56	49	55	50	-	-						
Av.							41.8	38.1	43.9	38.9	45.4	41.5	53.7	47.5	55.3	49.5	51.7	47.7	46.7	44.7				

Table 4. --Water temperatures in degrees Fahrenheit, Breitenbush River, Camp Mongold, Oreg., 1950
Thermograph near old highway bridge, 1/4 mi. from mouth of river, Sec. 10, T. 10S., R. 5E., Williamette, B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	--	--	--	--	--	--	--	--	42	40	46	41	51	46	57	51	55	51	50	47				
2	--	--	--	--	--	--	--	--	42	39	47	41	52	46	57	52	55	51	48	46				
3	--	--	--	--	--	--	--	--	42	40	47	41	52	46	55	51	55	51	49	48				
4	--	--	--	--	--	--	--	--	41	40	46	41	53	47	54	50	--	--	50	48				
5	--	--	--	--	--	--	--	--	41	40	45	42	53	47	53	50	--	--	50	48				
6	--	--	--	--	--	--	--	--	42	39	43	41	53	47	55	50	53	50	48	48				
7	--	--	--	--	--	--	--	--	43	40	42	41	53	47	56	50	53	50	50	48				
8	--	--	--	--	--	--	--	--	45	40	47	41	51	47	56	51	53	50	50	49				
9	--	--	--	--	--	--	--	--	46	40	45	42	52	48	56	51	54	50	50	48				
10	--	--	--	--	--	--	--	--	47	41	46	42	51	47	56	51	54	51	49	49				
11	--	--	--	--	--	--	--	--	46	40	43	42	53	45	56	51	55	51	52	49				
12	--	--	--	--	--	--	--	--	45	40	42	41	54	47	56	51	55	51	52	50				
13	--	--	--	--	--	--	42	40	45	40	43	42	55	48	55	51	55	50	--	--				
14	--	--	--	--	--	--	41	39	45	40	43	42	55	48	56	52	55	51	--	--				
15	--	--	--	--	--	--	41	40	45	39	47	42	54	48	57	52	55	50	--	--				
16	--	--	--	--	--	--	41	40	45	39	45	43	54	47	56	52	54	50	--	--				
17	--	--	--	--	--	--	43	40	42	40	43	42	55	48	57	52	55	51	--	--				
18	--	--	--	--	--	--	43	39	44	39	49	42	55	49	57	52	55	50	--	--				
19	--	--	--	--	--	--	44	39	45	39	49	43	54	50	56	52	55	51	--	--				
20	--	--	--	--	--	--	43	39	46	40	46	43	54	48	57	53	55	50	--	--				
21	--	--	--	--	--	--	43	40	47	40	48	43	55	49	56	53	54	50	--	--				
22	--	--	--	--	--	--	41	40	46	41	44	43	56	50	54	53	54	50	--	--				
23	--	--	--	--	--	--	42	38	45	39	44	43	56	50	53	53	53	50	--	--				
24	--	--	--	--	--	--	43	38	46	40	45	42	55	51	55	52	52	51	--	--				
25	--	--	--	--	--	--	41	39	46	40	45	43	55	49	55	51	52	51	--	--				
26	--	--	--	--	--	--	40	38	46	40	48	43	56	50	54	50	52	51	--	--				
27	--	--	--	--	--	--	40	39	44	41	48	44	54	52	55	50	52	50	--	--				
28	--	--	--	--	--	--	43	39	45	40	51	45	54	51	54	50	51	49	--	--				
29	--	--	--	--	--	--	44	39	44	41	51	45	53	50	55	51	50	48	--	--				
30	--	--	--	--	--	--	42	39	46	40	51	45	55	49	54	50	50	48	--	--				
31	--	--	--	--	--	--	--	--	47	40	--	--	56	50	54	50								
Av.							42.1	39.2	44.5	39.9	46.0	42.4	53.8	48.3	55.4	51.2	53.6	50.3	49.8	48.2				

Table 5. --Water temperatures in degrees Fahrenheit, Willamette River at Corvallis, 1950
Thermograph at Don's Boat Landing, Sec. 35, T. 11S., R. 5W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	40	38	32	31	42	41	49	48	50	48	59	56	67	64	72	68	70	66	55	53	47	45	43	43
2	38	36	31	30	44	42	48	45	50	48	59	56	68	63	70	68	72	68	54	52	48	47	43	42
3	36	34	30	30	46	44	45	44	48	47	59	56	68	64	68	66	70	66	52	52	49	48	43	41
4	35	34	32	30	46	45	47	44	47	46	59	56	68	64	68	64	68	66	54	52	50	49	45	43
5	36	34	35	32	45	44	46	46	48	45	57	55	68	64	66	64	68	64	55	53	49	48	44	44
6	39	36	36	35	44	42	46	44	48	46	55	54	69	65	66	62	66	64	54	53	49	48	45	44
7	39	37	37	36	42	41	47	45	48	47	54	50	68	65	68	64	66	64	55	53	49	49	45	44
8	37	36	38	37	42	41	47	45	49	47	53	49	67	64	68	64	68	64	55	54	49	48	44	44
9	37	36	40	38	43	42	47	46	52	47	56	52	66	63	70	66	66	63	55	53	48	46	45	44
10	37	36	41	40	43	42	49	46	56	51	58	55	65	62	70	66	64	62	55	54	46	44	45	44
11	36	36	41	40	42	41	48	48	58	54	56	53	65	61	70	66	64	60	56	54	44	43	46	45
12	36	35	41	41	42	40	48	46	59	56	53	49	68	62	70	68	64	61	56	54	44	43	46	45
13	36	35	43	41	42	41	48	46	57	55	50	49	69	64	70	66	63	62	58	55	44	42	45	44
14	35	33	43	43	43	42	46	45	55	53	52	49	70	66	70	66	63	60	57	54	43	42	44	43
15	33	32	43	43	45	43	48	46	54	52	52	52	70	66	72	68	63	60	54	52	42	41	45	44
16	34	33	44	42	46	44	48	47	54	52	56	52	70	66	72	68	62	60	52	51	42	40	46	45
17	34	32	44	43	47	45	50	46	53	52	56	55	71	66	74	70	63	60	52	51	44	42	46	45
18	32	30	43	42	45	43	52	49	52	50	57	54	70	67	74	70	63	61	53	52	44	43	46	46
19	33	30	44	42	44	42	52	49	54	51	60	56	70	67	74	70	62	60	54	53	43	42	46	46
20	37	33	43	43	44	44	52	50	56	52	60	57	71	66	74	70	63	60	54	53	45	43	46	46
21	38	37	44	43	44	43	50	49	58	54	57	55	72	67	74	70	64	60	53	52	46	45	46	45
22	39	37	43	43	44	43	50	48	58	56	57	55	73	68	70	68	65	62	52	51	45	44	46	46
23	40	39	44	42	43	43	48	47	56	54	56	54	73	68	68	64	64	61	54	52	44	44	47	46
24	40	38	46	44	44	43	50	47	55	53	55	53	74	69	66	64	62	60	54	53	46	44	46	45
25	38	36	46	45	43	43	50	48	57	53	55	53	73	70	66	64	60	60	54	52	47	46	45	45
26	37	36	46	44	43	42	48	46	58	55	58	54	72	68	68	62	60	58	52	50	47	46	45	45
27	37	35	44	42	44	42	48	46	57	54	59	56	70	66	70	66	58	56	50	48	47	46	45	43
28	35	35	43	42	44	43	50	46	54	53	64	58	66	64	70	66	57	54	48	48	46	45	44	43
29	35	34	-	-	45	43	51	48	55	52	66	61	66	64	70	66	57	54	48	46	45	43	45	44
30	34	33	-	-	46	45	50	49	57	54	67	64	68	62	70	66	57	54	46	46	44	43	45	44
31	33	32	-	-	48	45			58	55			70	64	70	66			46	45			44	42
Av.	36.3	34.8	40.6	39.4	44.0	42.7	48.6	46.6	53.9	51.4	57.2	54.3	69.2	65.1	69.9	66.3	63.7	61.0	53.1	51.6	45.9	44.6	45.0	44.2

Table 6. --Water temperatures in degrees Fahrenheit, Willamette River, Middle Fork, at Lowell Junction, 1950
Thermograph on river bank behind Noisy Creek Tavern, Sec. 23, T. 19S., R. 1W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	-	-	-	-	-	-	-	-	-	-	53	48	59	54	69	62	69	62	52	47				
2	-	-	-	-	-	-	-	-	46	44	53	48	60	55	69	62	69	63	49	47				
3	-	-	-	-	-	-	-	-	44	43	53	48	61	56	66	61	68	62	51	49				
4	-	-	-	-	-	-	-	-	44	43	53	49	62	56	63	59	66	62	53	50				
5	-	-	-	-	-	-	-	-	45	44	52	48	62	56	64	57	64	58	54	51				
6	-	-	-	-	-	-	-	-	46	43	52	48	62	57	65	58	64	58	51	50				
7	-	-	-	-	-	-	-	-	45	44	48	45	62	57	66	59	64	59	-	-				
8	-	-	-	-	-	-	-	-	49	44	52	44	61	57	67	60	64	59	-	-				
9	-	-	-	-	-	-	-	-	51	46	51	48	-	-	67	60	64	58	54	50				
10	-	-	-	-	-	-	-	-	52	47	52	48	-	-	68	60	61	58	54	51				
11	-	-	-	-	-	-	-	-	53	49	51	46	62	56	68	61	64	57	55	51				
12	-	-	-	-	-	-	-	-	52	48	46	45	64	57	68	61	64	58	56	51				
13	-	-	-	-	-	-	-	-	52	47	50	44	65	59	66	60	61	57	-	-				
14	-	-	-	-	-	-	-	-	50	45	50	47	66	60	69	61	60	56	-	-				
15	-	-	-	-	-	-	-	-	50	45	51	48	65	60	69	62	60	56	-	-				
16	-	-	-	-	-	-	-	-	50	46	53	49	65	60	69	61	61	55	-	-				
17	-	-	-	-	-	-	-	-	50	46	51	48	66	60	70	63	61	56	-	-				
18	-	-	-	-	-	-	48	44	49	45	54	48	66	60	70	63	61	56	-	-				
19	-	-	-	-	-	-	49	45	50	45	55	50	67	60	69	62	61	57	-	-				
20	-	-	-	-	-	-	49	45	52	47	54	50	66	60	70	62	61	55	-	-				
21	-	-	-	-	-	-	48	45	53	48	53	48	67	61	70	63	62	55	-	-				
22	-	-	-	-	-	-	47	44	52	48	53	49	68	61	67	63	61	56	-	-				
23	-	-	-	-	-	-	46	43	51	46	52	49	69	62	63	60	60	56	-	-				
24	-	-	-	-	-	-	47	42	51	46	50	47	70	63	62	60	60	56	-	-				
25	-	-	-	-	-	-	47	44	52	47	53	48	69	62	66	59	59	57	-	-				
26	-	-	-	-	-	-	45	43	52	48	54	49	68	62	68	61	57	54	-	-				
27	-	-	-	-	-	-	46	44	52	47	55	51	65	62	69	62	57	52	-	-				
28	-	-	-	-	-	-	49	43	50	45	59	52	62	59	69	62	56	52	-	-				
29	-	-	-	-	-	-	48	44	53	47	60	54	64	57	68	61	54	50	-	-				
30	-	-	-	-	-	-	47	45	53	48	59	55	66	58	68	61	53	48	-	-				
31	-	-	-	-	-	-	-	-	53	48	-	-	68	60	68	61	-	-						
Av.							47.4	43.9	50.1	46.0	52.7	48.4	64.7	58.9	67.4	60.9	61.5	56.6	52.9	49.7				

Table 7. --Water temperatures in degrees Fahrenheit, Willamette River, Middle Fork at Westfir Junction, 1950
Thermograph on Barnard Bridge, State Highway #58, Sec. 12, T. 21S., R. 2E., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	-	-	-	-	-	-	-	-	46	43	51	46	58	50	65	56	64	56	50	45				
2	-	-	-	-	-	-	-	-	45	42	51	45	58	50	64	56	64	56	48	45				
3	-	-	-	-	-	-	-	-	43	42	52	45	58	51	62	56	64	57	49	47				
4	-	-	-	-	-	-	-	-	43	42	51	46	59	52	58	54	60	56	51	49				
5	-	-	-	-	-	-	-	-	45	42	50	46	59	51	60	52	60	53	51	48				
6	-	-	-	-	-	-	-	-	46	41	49	45	60	52	62	52	61	54	50	48				
7	-	-	-	-	-	-	-	-	45	42	45	44	60	52	62	54	60	54	52	48				
8	-	-	-	-	-	-	-	-	49	42	50	43	-	-	62	54	59	56	51	50				
9	-	-	-	-	-	-	-	-	50	43	48	45	-	-	63	55	61	54	51	48				
10	-	-	-	-	-	-	-	-	52	44	50	46	-	-	63	55	60	54	52	48				
11	-	-	-	-	-	-	-	-	52	45	48	46	-	-	63	54	60	54	52	49				
12	-	-	-	-	-	-	-	-	52	45	46	44	60	52	64	54	60	53	52	49				
13	-	-	-	-	-	-	-	-	50	45	49	44	62	54	61	55	58	54	-	-				
14	-	-	-	-	-	-	-	-	49	44	49	45	62	54	64	56	58	52	-	-				
15	-	-	-	-	-	-	-	-	49	43	50	46	62	54	64	56	57	52	-	-				
16	-	-	-	-	-	-	-	-	49	44	51	46	62	53	-	-	58	52	-	-				
17	-	-	-	-	-	-	-	-	47	44	50	46	62	53	-	-	58	53	-	-				
18	-	-	-	-	-	-	-	-	48	43	53	46	61	54	-	-	58	52	-	-				
19	-	-	-	-	-	-	50	43	50	43	53	47	62	55	-	-	58	52	-	-				
20	-	-	-	-	-	-	47	44	51	44	52	48	62	54	-	-	58	51	-	-				
21	-	-	-	-	-	-	47	44	52	45	52	47	64	54	-	-	58	51	-	-				
22	-	-	-	-	-	-	45	43	51	45	50	47	64	55	-	-	57	52	-	-				
23	-	-	-	-	-	-	45	42	49	44	49	47	64	56	58	56	56	52	-	-				
24	-	-	-	-	-	-	47	41	50	44	49	46	64	56	58	56	58	52	-	-				
25	-	-	-	-	-	-	46	42	51	44	51	46	65	56	62	55	56	54	-	-				
26	-	-	-	-	-	-	44	41	51	45	52	46	64	56	64	56	54	52	-	-				
27	-	-	-	-	-	-	45	43	49	45	53	48	62	56	64	56	54	50	-	-				
28	-	-	-	-	-	-	48	42	49	44	57	48	58	54	64	56	53	48	-	-				
29	-	-	-	-	-	-	48	42	52	45	58	50	62	52	64	56	50	46	-	-				
30	-	-	-	-	-	-	45	43	52	46	57	50	62	54	64	56	50	46	-	-				
31	-	-	-	-	-	-	-	-	52	45	-	-	64	54	64	56	-	-	-	-				
Av.							46.4	42.5	49.0	43.7	50.9	46.1	61.5	53.5	62.5	55.1	58.1	52.6	50.8	47.8				

Table 8. --Water temperatures in degrees Fahrenheit, Willamette River, Coast Fork at Cottage Grove Dam, 1950
Thermograph on spillway wall of dam, Sec. 28, T. 21S., R. 3W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	-	-	-	-	-	-	-	-	47	46	-	-	54	51	56	53	58	56	62	61				
2	-	-	-	-	-	-	-	-	48	46	-	-	54	51	55	53	58	56	61	60				
3	-	-	-	-	-	-	-	-	50	46	-	-	54	51	55	53	58	56	60	60				
4	-	-	-	-	-	-	-	-	51	50	-	-	54	51	55	53	57	56	60	60				
5	-	-	-	-	-	-	-	-	52	51	-	-	54	51	55	53	58	55	60	59				
6	-	-	-	-	-	-	-	-	52	51	-	-	54	52	56	54	57	56	59	58				
7	-	-	-	-	-	-	-	-	52	50	-	-	54	52	56	54	58	56	58	57				
8	-	-	-	-	-	-	-	-	51	50	52	50	54	52	56	54	58	57	57	56				
9	-	-	-	-	-	-	-	-	-	-	52	50	53	52	56	54	58	57	58	57				
10	-	-	-	-	-	-	-	-	-	-	53	51	53	52	56	54	59	58	57	56				
11	-	-	-	-	-	-	-	-	-	-	-	50	54	51	56	54	59	58	57	56				
12	-	-	-	-	-	-	-	-	-	-	51	50	54	52	56	54	60	58	57	56				
13	-	-	-	-	-	-	-	-	-	-	51	50	54	52	56	54	60	59	57	57				
14	-	-	-	-	-	-	-	-	-	-	51	49	54	52	56	54	61	59	57	56				
15	-	-	-	-	-	-	-	-	-	-	51	50	54	52	57	54	61	60	57	56				
16	-	-	-	-	-	-	-	-	-	-	53	50	54	52	57	54	62	61	-	-				
17	-	-	-	-	-	-	47	45	-	-	53	50	55	52	57	54	62	61	-	-				
18	-	-	-	-	-	-	47	45	-	-	55	51	55	53	57	55	63	62	-	-				
19	-	-	-	-	-	-	48	45	-	-	55	52	55	53	57	55	64	63	-	-				
20	-	-	-	-	-	-	47	45	-	-	54	50	55	52	55	55	64	63	-	-				
21	-	-	-	-	-	-	46	45	-	-	51	50	55	53	57	55	65	63	-	-				
22	-	-	-	-	-	-	46	46	-	-	52	50	55	53	56	55	65	64	-	-				
23	-	-	-	-	-	-	47	45	-	-	52	50	55	53	56	55	65	64	-	-				
24	-	-	-	-	-	-	48	45	-	-	53	50	55	53	56	55	65	64	-	-				
25	-	-	-	-	-	-	47	46	-	-	52	50	55	53	57	55	65	64	-	-				
26	-	-	-	-	-	-	47	45	-	-	53	50	55	53	57	55	65	64	-	-				
27	-	-	-	-	-	-	47	46	-	-	53	51	54	53	57	55	64	64	-	-				
28	-	-	-	-	-	-	48	46	-	-	53	51	55	53	57	55	64	63	-	-				
29	-	-	-	-	-	-	48	46	-	-	54	51	55	53	57	55	63	62	-	-				
30	-	-	-	-	-	-	48	46	-	-	54	51	55	53	57	55	63	62	-	-				
31	-	-	-	-	-	-	-	-	-	-	-	-	56	53	58	55	-	-	-	-				
Av.							47.2	45.4	50.4	48.8	52.6	50.3	54.4	52.2	56.3	54.3	61.3	60.0	58.5	57.7				

Table 7. --Water temperatures in degrees Fahrenheit, Willamette River, Coast Fork near London, Oreg., 1950
Thermograph beside U.S.G.S. Gage on River bank, Sec. 20, T. 22S., R. 3W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	-	-	-	-	-	-	-	-	47	45	61	52	67	59	72	63	70	62	53	48				
2	-	-	-	-	-	-	-	-	46	43	61	52	68	58	72	64	71	63	52	48				
3	-	-	-	-	-	-	-	-	45	43	63	53	68	59	69	62	70	64	52	51				
4	-	-	-	-	-	-	-	-	45	43	61	54	69	60	66	60	69	64	55	52				
5	-	-	-	-	-	-	-	-	46	44	59	53	69	60	66	59	66	59	55	53				
6	-	-	-	-	-	-	-	-	47	42	56	52	69	60	68	58	65	58	54	52				
7	-	-	-	-	-	-	-	-	46	43	52	49	68	60	69	61	65	59	58	53				
8	-	-	-	-	-	-	-	-	51	43	58	48	66	58	70	61	65	60	-	-				
9	-	-	-	-	-	-	-	-	52	43	56	53	65	61	70	62	65	59	-	-				
10	-	-	-	-	-	-	-	-	55	45	58	53	64	57	70	61	65	60	-	-				
11	-	-	-	-	-	-	-	-	56	47	55	51	65	56	70	62	65	58	-	-				
12	-	-	-	-	-	-	-	-	56	48	51	50	68	57	70	62	65	59	-	-				
13	-	-	-	-	-	-	-	-	55	49	53	50	69	60	-	61	65	60	-	-				
14	-	-	-	-	-	-	-	-	55	47	55	50	69	60	-	-	61	57	-	-				
15	-	-	-	-	-	-	-	-	56	47	54	52	68	60	-	-	62	57	-	-				
16	-	-	-	-	-	-	-	-	56	46	57	52	68	60	-	-	62	57	-	-				
17	-	-	-	-	-	-	51	45	52	48	57	53	69	59	74	65	62	58	-	-				
18	-	-	-	-	-	-	51	43	54	46	62	53	69	60	-	-	62	58	-	-				
19	-	-	-	-	-	-	54	44	55	45	64	56	70	62	-	-	62	57	-	-				
20	-	-	-	-	-	-	51	45	57	47	62	56	69	61	73	64	62	56	-	-				
21	-	-	-	-	-	-	51	46	59	49	58	54	70	61	73	65	63	57	-	-				
22	-	-	-	-	-	-	50	45	56	51	60	54	71	62	71	65	63	58	-	-				
23	-	-	-	-	-	-	50	43	56	48	58	54	71	62	66	63	62	57	-	-				
24	-	-	-	-	-	-	51	41	57	47	55	51	71	63	65	63	63	59	-	-				
25	-	-	-	-	-	-	48	43	59	49	58	51	71	63	68	61	63	60	-	-				
26	-	-	-	-	-	-	47	42	59	51	60	54	73	64	70	62	60	58	-	-				
27	-	-	-	-	-	-	48	44	57	53	63	54	70	64	71	63	59	55	-	-				
28	-	-	-	-	-	-	50	44	56	48	67	57	64	61	70	62	57	52	-	-				
29	-	-	-	-	-	-	51	42	59	50	69	59	67	58	69	61	55	50	-	-				
30	-	-	-	-	-	-	49	44	59	51	68	60	68	59	69	62	53	49	-	-				
31	-	-	-	-	-	-	-	-	60	51	-	-	70	61	69	61	-	-	-	-				
Av.							50.1	43.6	53.8	46.8	59.0	53.0	68.5	60.2	69.6	62.0	63.2	58.0	54.1	51.0				

Table 10. --Water temperatures in degrees Fahrenheit, Row River, Dorena Reservoir outlet, 1950
Thermograph on Row River County Bridge, Sec. 32, T. 20S., R. 2W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	--	--	--	--	--	--	--	--	48	46	52	49	57	52	60	53	61	55	64	62	50	49	45	44
2	--	--	--	--	--	--	--	--	48	46	52	49	58	51	60	53	61	55	63	62	49	48	44	43
3	--	--	--	--	--	--	--	--	48	46	52	50	59	52	59	53	60	54	63	62	49	49	44	43
4	--	--	--	--	--	--	--	--	47	46	52	50	59	52	58	53	60	55	63	62	49	49	46	44
5	--	--	--	--	--	--	--	--	48	47	52	50	59	52	59	53	60	54	62	61	49	49	46	46
6	--	--	--	--	--	--	--	--	47	46	52	50	59	52	59	53	60	54	61	58	50	49	47	46
7	--	--	--	--	--	--	--	--	47	46	51	50	59	52	60	53	57	54	58	57	50	50	47	46
8	--	--	--	--	--	--	--	--	48	46	52	49	59	52	60	53	57	--	58	57	50	49	47	46
9	--	--	--	--	--	--	--	--	49	46	52	50	55	52	60	54	57	55	59	57	50	50	47	46
10	--	--	--	--	--	--	--	--	49	46	52	50	59	52	60	53	57	55	58	57	50	49	48	46
11	--	--	--	--	--	--	--	--	49	47	50	50	59	52	60	53	57	55	58	57	49	48	48	48
12	--	--	--	--	--	--	--	--	48	47	51	50	60	52	60	53	57	55	59	57	48	47	48	48
13	--	--	--	--	--	--	--	--	48	47	52	50	59	52	59	53	56	55	59	58	48	47	48	47
14	--	--	--	--	--	--	--	--	48	47	52	50	59	52	60	54	57	55	59	57	47	46	47	46
15	--	--	--	--	--	--	--	--	49	47	51	50	59	52	60	54	57	56	60	58	46	45	47	47
16	--	--	--	--	--	--	--	--	51	47	52	50	59	52	61	54	57	56	60	59	45	44	47	47
17	--	--	--	--	--	--	--	--	49	48	52	50	60	52	61	54	58	56	60	59	46	45	48	47
18	--	--	--	--	--	--	--	--	50	48	53	50	59	52	61	54	57	56	60	58	46	45	48	48
19	--	--	--	--	--	--	--	--	50	48	54	50	60	53	61	54	58	56	58	57	46	45	48	48
20	--	--	--	--	--	--	47	46	50	48	52	51	60	52	61	54	58	56	58	57	47	46	48	48
21	--	--	--	--	--	--	47	46	50	48	53	51	60	53	61	54	59	57	57	57	47	46	48	47
22	--	--	--	--	--	--	47	46	50	49	53	51	60	53	57	54	59	57	58	57	46	45	48	48
23	--	--	--	--	--	--	47	46	50	49	52	51	60	52	56	54	59	57	58	57	45	45	48	47
24	--	--	--	--	--	--	49	45	51	49	53	51	60	53	57	54	59	58	58	57	46	45	47	46
25	--	--	--	--	--	--	49	46	52	49	54	51	60	53	60	54	59	58	58	57	48	46	--	--
26	--	--	--	--	--	--	48	46	51	49	55	51	60	53	60	54	60	59	58	57	48	47	--	--
27	--	--	--	--	--	--	48	46	50	49	55	51	56	53	61	54	61	59	57	56	--	--	46	46
28	--	--	--	--	--	--	50	46	50	49	56	51	56	53	61	54	62	61	56	51	48	46	46	46
29	--	--	--	--	--	--	49	46	51	49	56	51	59	53	61	54	63	61	51	50	46	46	46	45
30	--	--	--	--	--	--	49	46	52	49	56	52	60	52	60	54	64	62	51	50	46	45	46	45
31	--	--	--	--	--	--	--	--	52	49			60	53	60	54	--	--	50	50	--	--	45	45
Av.							48.2	45.9	49.4	47.5	52.7	50.3	58.9	52.3	59.8	53.6	58.9	56.4	58.5	57.1	47.7	46.9	46.8	46.2

Table 11. —Water temperatures in degrees Fahrenheit, Row River, Dorena Reservoir Inlet, 1950
Thermograph on bank of river at U.S.G.S. Gage Station near Star, Sec. 24, T. 21S, R. 2W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	–	–	–	–	–	–	–	–	46	43	51	48	67	61	75	67	–	–	54	49	48	47	44	43
2	–	–	–	–	–	–	–	–	44	41	57	48	67	61	73	68	74	–	51	48	50	48	43	42
3	–	–	–	–	–	–	–	–	–	–	58	49	68	63	73	67	73	67	53	51	50	49	45	43
4	–	–	–	–	–	–	–	–	–	–	57	50	69	64	69	64	71	67	54	52	50	48	47	45
5	–	–	–	–	–	–	–	–	–	–	55	50	69	64	69	62	69	62	54	51	50	49	46	45
6	–	–	–	–	–	–	–	–	–	–	53	49	70	64	71	62	68	61	52	50	50	49	47	46
7	–	–	–	–	–	–	–	–	–	–	49	47	70	65	73	64	68	61	–	–	49	48	47	46
8	–	–	–	–	–	–	–	–	–	–	56	46	68	64	73	65	68	62	–	–	50	48	47	46
9	–	–	–	–	–	–	–	–	–	–	56	51	66	63	73	66	–	62	–	–	48	44	48	47
10	–	–	–	–	–	–	–	–	–	–	56	52	67	62	74	66	67	60	54	51	45	42	47	46
11	–	–	–	–	–	–	–	–	–	–	56	50	67	61	74	66	68	61	55	52	45	42	48	47
12	–	–	–	–	–	–	–	–	–	–	49	47	70	62	74	66	67	62	56	53	46	45	48	46
13	–	–	–	–	–	–	–	–	–	–	51	47	72	65	72	65	64	59	57	55	45	44	46	44
14	–	–	–	–	–	–	–	–	–	–	54	49	72	66	75	67	63	59	56	54	44	43	47	45
15	–	–	–	–	–	–	–	–	–	–	55	50	72	65	76	67	64	58	54	52	43	42	48	46
16	–	–	–	–	–	–	–	–	–	–	57	51	71	65	76	67	–	–	53	52	46	43	47	47
17	–	–	–	–	–	–	–	–	–	–	56	52	72	64	77	68	64	59	–	–	46	46	47	46
18	–	–	–	–	–	–	–	–	–	–	61	52	72	65	77	68	62	59	–	–	46	45	47	46
19	–	–	–	–	–	–	–	–	–	–	62	54	74	66	76	67	65	59	–	–	46	45	48	47
20	–	–	–	–	–	–	47	43	–	–	–	–	74	66	77	62	65	58	–	–	47	45	48	46
21	–	–	–	–	–	–	48	43	–	–	–	–	74	66	76	68	65	59	–	–	46	45	46	44
22	–	–	–	–	–	–	46	43	–	–	58	53	70	67	71	68	65	59	–	–	45	43	47	46
23	–	–	–	–	–	–	47	42	–	–	57	53	71	67	68	66	64	59	–	–	46	42	47	45
24	–	–	–	–	–	–	48	40	–	–	54	51	76	68	67	65	64	60	54	52	48	46	–	–
25	–	–	–	–	–	–	47	42	–	–	57	51	76	68	70	63	63	61	53	50	47	46	–	–
26	–	–	–	–	–	–	44	40	–	–	59	53	76	68	72	64	61	57	50	48	47	46	–	–
27	–	–	–	–	–	–	45	42	–	–	61	54	72	67	74	66	58	55	49	48	48	45	44	43
28	–	–	–	–	–	–	49	42	–	–	65	57	67	64	74	66	58	53	49	47	45	43	45	44
29	–	–	–	–	–	–	48	41	–	–	67	60	69	62	73	65	–	–	–	–	44	43	47	45
30	–	–	–	–	–	–	46	42	–	–	67	61	71	62	–	–	55	50	–	–	45	44	46	43
31	–	–	–	–	–	–	–	–	–	–	–	–	74	64	–	–	–	–	47	45	–	–	43	42
Av.							46.8	41.8	45.0	42.0	56.9	51.2	70.7	64.5	73.2	65.7	65.1	59.6	52.9	50.5	46.8	45.2	46.4	45.0

Table 12. --Water temperatures in degrees Fahrenheit, Long Tom River at Monroe, Oreg., 1950
Thermograph on highway bridge U.S. Highway 99W., Sec. 33, T. 14S., R. 5W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	-	-	-	-	-	-	-	-	56	53	71	65	76	74	76	73	74	71	62	58				
2	-	-	-	-	-	-	-	-	56	52	70	66	78	74	78	74	73	72	59	57				
3	-	-	-	-	-	-	-	-	54	51	70	66	76	74	76	72	74	72	58	58				
4	-	-	-	-	-	-	-	-	54	52	68	66	76	74	74	70	74	71	60	58				
5	-	-	-	-	-	-	-	-	54	51	70	66	76	74	70	69	72	69	60	59				
6	-	-	-	-	-	-	-	-	56	51	68	65	77	74	73	69	71	69	60	58				
7	-	-	-	-	-	-	-	-	57	52	65	62	77	73	72	70	70	67	62	58				
8	-	-	-	-	-	-	-	-	57	53	62	60	75	73	73	71	68	67	60	59				
9	-	-	-	-	-	-	-	-	58	54	66	61	75	72	73	71	68	67	61	57				
10	-	-	-	-	-	-	-	-	64	56	65	64	74	70	76	72	68	67	62	58				
11	-	-	-	-	-	-	-	-	64	61	66	64	74	70	74	73	69	66	62	60				
12	-	-	-	-	-	-	-	-	67	62	65	62	73	70	74	72	68	67	-	-				
13	-	-	-	-	-	-	-	-	68	64	62	62	73	71	73	72	70	67	-	-				
14	-	-	-	-	-	-	-	-	67	64	65	62	75	73	76	72	70	65	-	-				
15	-	-	-	-	-	-	-	-	-	-	65	64	77	74	75	74	69	65	-	-				
16	-	-	-	-	-	-	-	-	-	-	66	63	76	72	76	74	68	65	-	-				
17	-	-	-	-	-	-	-	-	-	-	67	64	76	73	75	74	69	65	-	-				
18	-	-	-	-	-	-	-	-	-	-	67	65	75	73	76	74	68	64	-	-				
19	-	-	-	-	-	-	-	-	64	60	68	66	78	74	76	75	69	65	-	-				
20	-	-	-	-	-	-	-	-	64	62	71	68	76	73	76	75	68	64	-	-				
21	-	-	-	-	-	-	60	54	70	61	70	68	74	73	76	75	69	63	-	-				
22	-	-	-	-	-	-	58	54	69	64	69	67	74	73	76	74	68	64	-	-				
23	-	-	-	-	-	-	58	52	67	63	68	64	77	74	74	70	68	64	-	-				
24	-	-	-	-	-	-	59	52	67	62	64	63	78	75	71	70	67	66	-	-				
25	-	-	-	-	-	-	59	54	66	63	64	63	78	75	71	69	67	65	-	-				
26	-	-	-	-	-	-	58	52	66	64	65	63	78	75	70	69	66	64	-	-				
27	-	-	-	-	-	-	55	51	68	64	67	64	78	72	76	69	65	61	-	-				
28	-	-	-	-	-	-	57	51	66	63	70	67	72	70	75	72	64	60	-	-				
29	-	-	-	-	-	-	58	54	68	62	73	69	73	70	75	72	64	60	-	-				
30	-	-	-	-	-	-	58	54	67	64	75	72	74	70	76	72	63	60	-	-				
31	-	-	-	-	-	-	-	-	69	64	-	-	76	72	74	71	-	-	-	-				
Av.							58.0	52.8	63.1	58.9	67.4	64.7	75.6	72.7	74.4	71.9	68.7	65.5	60.5	58.2				

Table 13. —Water temperatures in degrees Fahrenheit, Willamette River at Eugene, Oreg., 1950
Cooling water temperatures at Eugene Water and Electric Board Steam Plant, Sec. 32, T. 17S., R. 3W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	–	–	–	–	–	–	–	–	–	–	56	54	64	60	–	–	–	–	58	54				
2	–	–	–	–	–	–	–	–	–	–	–	–	65	60	–	–	–	–	55	54				
3	–	–	–	–	–	–	–	–	–	–	56	53	66	60	–	–	–	–	56	54				
4	–	–	–	–	–	–	–	–	–	–	56	54	65	60	–	–	69	66	57	55				
5	–	–	–	–	–	–	–	–	–	–	54	53	66	61	–	–	68	64	57	57				
6	–	–	–	–	–	–	–	–	–	–	55	52	68	62	–	–	66	63	57	55				
7	–	–	–	–	–	–	–	–	–	–	50	48	67	61	70	64	66	63	58	55				
8	–	–	–	–	–	–	–	–	–	–	54	47	65	61	–	–	66	63	–	–				
9	–	–	–	–	–	–	–	–	–	–	54	53	64	62	70	65	66	62	57	54				
10	–	–	–	–	–	–	–	–	–	–	55	52	63	59	71	66	62	60	58	56				
11	–	–	–	–	–	–	–	–	–	–	54	52	64	59	70	66	64	59	58	56				
12	–	–	–	–	–	–	–	–	–	–	50	50	68	61	–	–	66	61	58	57				
13	–	–	–	–	–	–	–	–	–	–	49	48	69	62	–	–	62	62	60	58				
14	–	–	–	–	–	–	–	–	–	–	52	52	70	64	72	66	61	60	58	58				
15	–	–	–	–	–	–	–	–	–	–	52	52	70	64	73	67	61	59	55	54				
16	–	–	–	–	–	–	–	–	–	–	54	52	69	63	73	68	62	59	54	53				
17	–	–	–	–	–	–	–	–	–	–	54	52	70	64	74	68	64	60	54	54				
18	–	–	–	–	–	–	–	–	–	–	58	53	70	64	74	68	62	61	57	54				
19	–	–	–	–	–	–	–	–	–	–	59	56	71	65	73	68	62	60	57	56				
20	–	–	–	–	–	–	–	–	–	–	57	56	71	65	–	–	63	60	56	56				
21	–	–	–	–	–	–	–	–	–	–	53	52	72	66	74	69	64	60	55	54				
22	–	–	–	–	–	–	–	–	–	–	55	54	72	66	68	68	65	61	56	54				
23	–	–	–	–	–	–	–	–	–	–	53	53	72	68	66	66	64	60	57	56				
24	–	–	–	–	–	–	–	–	–	–	53	51	74	68	65	64	62	61	57	56				
25	–	–	–	–	–	–	–	–	–	–	55	52	74	68	66	62	62	62	56	55				
26	–	–	–	–	–	–	–	–	–	–	57	54	73	–	70	64	60	60	52	52				
27	–	–	–	–	–	–	–	–	–	–	58	55	68	68	68	66	59	56	51	51				
28	–	–	–	–	–	–	–	–	–	–	64	57	66	64	71	66	58	56	50	50				
29	–	–	–	–	–	–	–	–	–	–	65	60	67	62	71	66	58	55	50	49				
30	–	–	–	–	–	–	–	–	–	–	65	61	69	63	70	66	58	55	48	48				
31	–	–	–	–	–	–	–	–	–	–	–	–	–	64	70	65	–	–	48	48				
Av.											55.4	53.0	68.4	63.1	70.4	66.1	63.0	60.3	55.3	54.1				

Table 14. --Water temperatures in degrees Fahrenheit, Willamette River at Corvallis, Oreg., 1948
Thermograph at Don's Boat Landing, Sec. 35, T. 11S., R. 5W., Willamette B.&M.

Date	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71	68	67	63	58	55	44	42	44	44
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70	68	67	64	59	56	42	41	45	44
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69	66	68	65	59	58	41	40	45	43
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	65	67	64	60	59	40	37	43	42
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	63	66	63	59	58	-	-	42	42
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	68	64	67	63	58	57	-	-	43	42
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	68	65	66	64	58	57	-	-	45	43
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	68	65	68	63	58	56	47	-	45	44
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66	64	69	64	57	56	46	44	46	44
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69	67	70	66	58	56	45	44	46	45
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	65	70	66	58	57	44	43	46	45
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69	64	70	66	57	56	-	-	46	45
13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69	67	70	66	57	56	-	-	45	44
14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	68	65	67	65	57	56	-	-	44	43
15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66	64	65	63	56	54	-	-	43	42
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66	63	64	62	56	54	48	-	42	41
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66	64	64	61	55	53	47	45	41	40
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65	63	64	61	55	53	45	44	40	38
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65	63	64	61	55	53	46	44	40	38
20	-	-	-	-	-	-	-	-	-	-	-	-	70	-	65	61	65	61	53	52	46	45	41	40
21	-	-	-	-	-	-	-	-	-	-	-	-	69	66	67	63	64	62	52	51	46	45	41	40
22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	64	62	59	53	52	48	46	41	40
23	-	-	-	-	-	-	-	-	-	-	-	-	70	-	66	63	59	56	52	52	49	47	40	38
24	-	-	-	-	-	-	-	-	-	-	-	-	68	65	64	62	56	54	53	52	48	47	38	36
25	-	-	-	-	-	-	-	-	-	-	-	-	68	64	65	61	55	53	53	51	47	46	36	35
26	-	-	-	-	-	-	-	-	-	-	-	-	69	65	65	62	54	53	52	51	46	45	36	35
27	-	-	-	-	-	-	-	-	-	-	-	-	68	66	68	64	56	53	51	48	45	44	37	35
28	-	-	-	-	-	-	-	-	-	-	-	-	66	63	69	65	57	55	48	46	45	44	39	37
29	-	-	-	-	-	-	-	-	-	-	-	-	66	62	69	66	57	54	45	44	45	44	40	39
30	-	-	-	-	-	-	-	-	-	-	-	-	69	64	68	66	57	54	44	44	45	44	40	39
31	-	-	-	-	-	-	-	-	-	-	-	-	71	66	68	64	-	-	45	43	-	-	41	39
Av.													68.5	64.6	67.3	64.3	63.8	60.8	54.5	53.1	45.4	43.9	42.0	40.7

Table 15. —Water temperatures in degrees Fahrenheit, Willamette River at Corvallis, Oreg., 1949
Thermograph at Don's Boat Landing, Sec., 35, T. 11S., R. 5W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	41	39	40	38	46	45	49	47	50	48	56	54	66	61	74	70	69	65	62	60	52	50	48	47
2	39	37	39	39	47	45	49	47	50	48	57	53	67	63	71	69	71	67	60	58	51	49	48	46
3	37	37	39	38	47	46	51	47	50	48	60	55	68	64	70	67	72	68	60	58	51	48	46	43
4	37	35	39	37	48	46	53	49	51	49	63	58	68	64	71	67	72	69	58	57	51	49	43	42
5	35	35	37	36	48	46	55	51	53	49	66	61	67	65	73	69	71	68	57	56	50	49	43	42
6	36	34	37	36	46	45	–	–	56	52	67	63	66	63	–	–	68	66	56	53	50	48	43	42
7	–	–	37	36	47	45	–	–	57	54	65	63	67	62	–	–	69	65	54	52	50	48	42	42
8	–	–	37	36	46	45	–	–	56	54	64	61	70	65	–	–	70	65	53	51	50	48	42	41
9	37	34	–	–	45	44	–	–	57	54	63	61	69	67	–	–	69	67	53	52	48	47	42	42
10	34	32	–	–	46	44	–	–	59	55	65	61	70	66	–	–	67	64	54	52	47	46	42	40
11	33	32	–	–	47	45	–	–	60	57	65	61	71	67	68	66	65	62	54	52	49	47	40	39
12	32	31	–	–	48	46	–	–	60	58	66	61	72	68	68	66	65	61	54	52	50	48	40	39
13	33	31	–	–	47	47	–	–	59	55	66	62	74	69	68	64	65	62	53	51	48	47	41	40
14	34	32	–	–	48	46	–	–	55	54	67	63	75	71	68	64	64	62	53	50	49	47	41	40
15	36	34	–	–	48	47	–	–	57	54	66	62	74	71	70	65	62	61	53	51	49	48	41	40
16	37	35	43	–	48	47	–	–	56	54	64	62	72	70	70	67	63	60	–	–	48	46	41	41
17	38	37	44	43	49	48	–	–	56	54	64	60	71	68	70	67	63	60	–	–	46	45	42	41
18	38	37	44	43	49	48	–	–	56	54	65	61	70	68	71	67	63	60	49	48	46	45	41	40
19	39	38	45	43	49	48	–	–	55	54	65	62	68	65	72	68	64	62	48	46	46	44	40	39
20	38	36	45	44	48	46	52	50	57	55	65	61	67	64	70	68	63	60	48	45	44	43	39	39
21	36	35	46	44	47	46	50	50	58	55	67	63	68	64	70	66	62	58	48	45	44	43	40	39
22	36	35	47	46	48	46	52	50	58	55	67	64	69	66	70	66	63	60	47	45	45	43	42	40
23	35	34	47	46	48	47	54	52	61	57	67	64	68	67	70	66	63	61	46	45	48	45	43	42
24	34	33	47	45	48	46	53	50	61	58	67	63	67	65	68	66	61	60	46	45	49	47	43	41
25	33	32	47	46	49	47	54	50	62	58	66	63	65	64	69	65	62	60	47	46	51	49	41	40
26	33	32	47	46	48	46	55	52	62	59	64	61	67	64	70	66	64	59	48	46	52	50	41	41
27	34	33	46	45	46	45	55	53	61	58	64	60	68	65	71	67	64	61	51	47	52	50	42	41
28	35	34	46	45	48	45	54	52	58	56	63	61	70	65	72	68	62	60	54	51	50	49	44	42
29	37	35	–	–	48	46	53	50	58	55	62	59	72	67	73	69	62	60	53	51	49	48	42	41
30	38	37	–	–	48	46	50	49	57	55	64	59	73	69	71	69	62	60	52	49	48	47	41	40
31	39	38	–	–	49	46	–	–	–	–	–	–	73	70	69	66	–	–	52	49	–	–	41	40
Av.	36.0	34.6	42.8	41.6	47.5	46.0	52.4	49.9	56.9	54.2	64.3	60.7	69.4	66.0	70.3	66.8	65.3	60.4	52.5	50.4	46.8	47.1	42.1	41.0

Table 16. —Water temperatures in degrees Fahrenheit, McKenzie River near Walterville, 1950
Thermograph on Hendricks Bridge, U.S. Highway 28, Sec. 29, T. 17S., R. 1W., Willamette B.&M.

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Date	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	–	–	–	–	–	–	–	–	45	45	50	48	54	53	63	57	63	57	50	47	–	–	44	42
2	–	–	–	–	–	–	–	–	45	44	50	48	55	53	63	58	64	57	48	46	–	–	42	42
3	–	–	–	–	–	–	–	–	44	43	50	48	55	54	62	57	62	57	48	47	–	–	43	42
4	–	–	–	–	–	–	–	–	44	43	50	48	55	54	59	55	62	57	50	48	48	47	44	43
5	–	–	–	–	–	–	–	–	44	43	49	48	56	54	58	55	61	55	50	49	48	47	44	44
6	–	–	–	–	–	–	–	–	44	43	49	47	56	55	59	54	61	54	50	49	48	47	45	44
7	–	–	–	–	–	–	–	–	44	44	47	45	56	54	61	55	61	55	50	49	47	47	45	44
8	–	–	–	–	–	–	–	–	47	44	48	44	55	53	62	56	60	54	51	50	47	47	45	44
9	–	–	–	–	–	–	–	–	48	46	49	47	54	52	62	57	59	54	51	49	47	44	45	45
10	–	–	–	–	–	–	–	–	50	47	49	47	54	52	62	57	56	54	51	49	44	43	45	44
11	–	–	–	–	–	–	–	–	50	49	49	45	55	53	63	57	60	53	51	49	43	43	46	45
12	–	–	–	–	–	–	–	–	50	48	45	44	57	53	63	57	59	54	51	49	44	43	46	45
13	–	–	–	–	–	–	–	–	49	46	46	44	58	54	61	56	56	54	52	49	44	42	45	43
14	–	–	–	–	–	–	–	–	49	45	47	46	58	55	63	57	56	52	50	49	43	42	45	43
15	–	–	–	–	–	–	–	–	48	46	48	46	58	55	64	57	56	52	50	49	43	42	45	45
16	–	–	–	–	–	–	–	–	48	46	50	48	58	55	64	57	57	52	49	48	44	43	46	45
17	–	–	–	–	–	–	–	–	48	45	49	47	58	55	64	58	57	52	49	48	44	44	45	45
18	–	–	–	–	–	–	46	44	47	44	50	47	58	55	64	58	55	52	50	48	44	43	45	44
19	–	–	–	–	–	–	47	45	47	45	51	49	59	56	64	58	57	53	50	49	44	44	46	45
20	–	–	–	–	–	–	47	45	48	47	51	48	59	55	64	58	57	52	50	49	45	44	46	45
21	–	–	–	–	–	–	46	44	49	48	50	47	59	55	64	58	58	52	50	49	45	44	45	44
22	–	–	–	–	–	–	46	44	50	47	50	48	60	56	60	57	57	52	50	49	45	44	45	44
23	–	–	–	–	–	–	44	43	49	46	48	47	61	56	57	55	56	52	51	49	44	43	45	45
24	–	–	–	–	–	–	45	43	48	46	48	47	62	57	56	54	54	52	51	49	45	44	45	44
25	–	–	–	–	–	–	45	44	49	47	48	47	64	57	60	54	54	52	49	48	45	45	–	–
26	–	–	–	–	–	–	44	43	49	48	50	48	63	58	63	56	53	51	48	47	45	44	–	–
27	–	–	–	–	–	–	44	43	49	47	51	49	59	56	63	57	53	50	47	47	45	45	–	–
28	–	–	–	–	–	–	46	43	47	46	53	50	58	55	63	57	53	50	47	47	45	43	–	–
29	–	–	–	–	–	–	46	45	48	47	54	53	58	54	63	57	52	48	–	–	43	43	45	44
30	–	–	–	–	–	–	46	44	49	47	54	53	60	55	63	57	51	47	–	–	44	43	45	43
31	–	–	–	–	–	–	–	–	49	48	–	–	62	56	63	56	–	–	–	–	–	–	43	42
Av.							45.5	43.8	47.6	45.8	49.4	47.4	57.9	54.7	61.9	56.8	57.3	52.9	49.8	48.4	44.9	44.1	44.8	43.9